



Forest Insect & Disease Management

Survey Report

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USING WHITE PINE AS A VEGETATIVE MONITOR FOR OZONE AND SULFUR DIOXIDE DETECTION

St. Paul Field Office

INTRODUCTION

For several years, browning of distal ends of white pine needles was reported from the western portions of upper Michigan and northeastern Wisconsin. The symptoms appeared similar to chemical gas injury, such as ozone and/or sulfur dioxide. Since some genetic variants of white pine show high sensitivity to ozone and injury, this type was selected for and outplanted in areas where the injury was common. This report is based on work initiated by J. T. O'Brien and Allen Prey (Wisconsin DNR, Forest Insect and Disease Management) in 1969-70.

OBJECTIVE

The objective was to establish a monitoring system using susceptible white pine seedlings, for determining the specific cause of white pine needle necrosis in northern Wisconsin and the western upper Michigan.

METHODS

Ten white pine scions were selected from eight resistant and eight susceptible clones for use in the monitoring project. The clone material was collected from the susceptible and resistant clones by the Wisconsin Department of Natural Resources, and transported to the U. S. Forest Service seed orchard at Oconto River, Wisconsin for potting and grafting. The rootstock was provided by the Wisconsin DNR.

Unfortunately, most of the susceptible plants died after a year of growth and only 10 susceptible trees survived. They were previously tested for susceptibility to SO_2 and O_3 and were found to show symptoms after six hours exposure to 2.5 pphm SO_2 and 5 pphm O_3 (tests were made by D. B. Houston and G. R. Stairs, University of Wisconsin). The trees from resistant clones did not show symptoms at the same rates of exposure. Five trees were outplanted at each of two locations, Watersmeet, Michigan and the Oconto Seed Orchard.

RESULTS

Although outplantings were made and the small number of trees will be observed annually, the evaluation is being suspended because of the small number of trees, and the availability of more sophisticated mobile van analyzers that can distinguish between atmospheric gases. However, these two plantings will be used for demonstrating the effects of atmospheric gases on white pine at the Toumey Nursery and Oconto Seed Orchard. Susceptible clones had brown needles while the resistant clones were not affected by the atmospheric gases.